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(19)

(54) SEALED-BEAM HEADLAMP FOR MOTOR VEHICLES

(71) We, ROBERT BOSCH GMBH. a German Company, of Postfach 50, 7 Stuttgart 1, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement.

The invention relates to sealed-beam headlamps for motor vehicles.

Headlamps of sealed beam construction are used increasingly for motor cars because they provide efficient operation over a longer period of time than is the case with headlamp types that can be disassembled. Closed, so-called sealed-beam headlamps are known where the reflector, the diffusing lens and ring elements are combined to a single nit and where a protective gas permanently protects the inside of the headlamp, in particular the sensitive reflecting layer thereof. Although such a construction becomes unusable if a slight defect occurs and consequently has to be replaced by a new one, the gas-tight, sealed beam construction is gaining more and more in importance, because noxious exhaust gases and atmospheric moisture cannot penetrate into the interior of the headlamp. Consequently, dimming of the reflecting layer, rusting of the inside of the reflector, or tarnishing of the diffusing lens is largely avoided, which in view of to-day's air pollution is particularly important.

A sealed beam headlamp is already known whose diffusing lens is cemented to a sheet-metal reflector and wherein the electrodes supporting the filament are passed in an air-tight manner through a metal socket, a cap-like lamp-plate or dish being welded to the rim of the reflector. Further known headlamps of this type have an incandescent bulb with an annular groove into which the neck of the reflector is cemented by means of a sealing compound; in the same manner the rim of the reflector is cemented into a groove of the diffusing lens. It is the particular purpose of this latter construction to embed the edges, which are very much subject to rusting in the sealing compound.

In a further known construction of a sealed beam headlamp, a glass socket receiving the electrodes is used with a centering ring of metal, which can be fitted into the vertex opening of the reflector. A glass bulb may be fitted onto the ring so that the electrodes with their filaments are enclosed towards the interior of the reflector. In such a construction a perfect alignment of the filaments in respect of the reflector is achieved without the holder of the incandescent lamp actually having to take part in the adjustment.

One further known headlamp comprises a reflector having a bulb mounted, by means of a support assembly, in a non-sealed manner in a rear opening of the reflector. A removable cover is hermetically sealed against a portion of the reflector surrounding but slightly spaced from the opening. In a modified version of this headlamp a sealing member is interposed between a neck of the reflector defining said opening and said cover, the cover being releasably held against the sealing member to provide the hermetic seal.

In accordance with the present invention, there is provided a sealed beam headlamp for motor vehicles comprising a metal reflector with a diffusing lens attached thereto, the vertex region of the reflector containing an opening in which the bulb of a sealed halogen lamp is fixed by means of a socket and a lamp plate, in such a manner that the lamp is non-releasably, as herein defined, and hermetically sealed within the reflector, the lamp plate being welded, soldered, or cemented to or being moulded onto the rim of the opening.

Non-releasable is taken here to mean that

the lamp cannot be removed without causing damage to the headlamp.

The arrangement in accordance with the invention has the advantage that the bulb can be simply mounted in the headlamp by providing the reflector with a neck and without using a special centering device.

A manufacturing technique resulting in favourable production cost results, when the lamp has a flattened bulb portion from which the lamp electrodes emerge, the lamp electrodes extending through the lamp plate in a gas-tight manner and the flattened bulb portion being held in the socket by means of a cement.

Preferably, the socket is in this case formed from sheet metal and comprises a flange portion attached to the lamp plate and a conical funnel portion which receives the flattened bulb portion and the cement. Advantageously the lamp plate is also formed of sheet metal and comprises a flanged portion bearing an axially extending ring portion which is tightly sealed by a circumferential welded seam to the reflector neck. The passage of the electrodes through the lamp plate is solved in a simple manner if the lamp plate has a base having a respective aperture therethrough for each electrode of the lamp into which a length of tubing is sealed by means of fused glass, each length of tubing being joined by a soldered joint to the electrode passing through it.

It has been found to be appropriate to provide a construction in which a ring having an inwardly directed flange on one axial end and a number of inwardly directed lugs on its other end engages over the reflector neck, the annular trough thereby formed between the ring and the reflector neck receiving a synthetic resin compound serving to cement the lamp plate to the neck, the lamp plate being in the form of a generally annular disc whose inner edge engages the periphery of the lamp bulb in a gas-tight manner and whose outer edge extends substantially axially and projects into said resin compound, the lugs on the ring gripping around the rear of the lamp plate. If manufacturing processes are specified which do not permit a welding to the surface-treated reflector, it is possible for the lamp plate to be constructed s a glass plate whose periphery has an axially directed portion having a U-shaped annular groove therein which receives a sealing compound, serving to cement the lamp plate to the neck, the reflector neck extending into the sealing compound to effect said gas-tight connection.

If the reflector has not got a neck, a gas-tight connection between the glass plate and the reflector may still be achieved if a holder ring of S-shaped cross-section forms the reflector neck, one loop of the ring embracing the reflector and its other loop gripping the peripheral edge of the glass lamp plate, the reflector and the glass plate being cemented to the ring and thus to each other by a sealing medium.

If a gas-tight halogen bulb whose socket is sealed gas-tight by a socket plug is available, it has been found appropriate for the socket to be received in tightly fitting relationship by the neck and by a plastics sleeve serving as the lamp plate and surrounding both the rear end of the socket and the socket plug.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:- Figure 1 is a general, cross-sectional view of a sealed beam headlamp in accordance with the invention;

Figure 2 is a section through part of a first embodiment of headlamp in accordance with the present invention;

Figure 3 is a sectional detail view of a modified version of the embodiment of Figure 2;

Figure 4 is a section through part of a second embodiment of headlamp in accordance with the present invention;

Figure 5 is a sectional detail view of a modified version of the embodiment of Figure 4;

Figure 6 is a section through part of a third embodiment of headlamp in accordance with the present invention;

Figure 7 is a section through part of a fourth embodiment of headlamp in accordance with the invention; and

Figure 8 is a section through part of a fifth embodiment of headlamp in accordance with the invention.

The sealed beam headlamp 10 of Figure 1 has an optical axis 0-0 and comprises a reflector 11 of sheet-metal, the light output opening of which has a radial and axial bend 12 into which is cemented the edge 13 of a diffusing lens 14. A cylindrical neck 15 is formed on the reflector 11 in the region of the vertex aperture, the neck 15 enclosing a lamp plate 16 drawn from sheet metal. The plate 16 carries on its inside a lamp bulb 17 having a double filament incandescent coil 18. The dish 16 also carries a cross-piece 19 of a beam cover plate 20 for partially screening directly emitted light.

In the first embodiment shown in section in Figure 2, the reflector 11, with its neck 15 extending parallel to the optical axis 0-0, receives the lamp plate 16. The plate 16, which is made of drawn sheet, comprises a base portion 21 formed with three bulge-like apertures 22 therein, an annular side portion 23 which is connected to a peripheral ring portion 25 bent over in a direction towards the rear of the reflector 11, and a radially extending flange portion 24. The rearward edge of the neck 15 is welded to the edge of the ring 25, so that a circumferential welded

seam 26 is formed. A socket 28, also drawn from sheet-metal, has a flange 29 which bears against the flange portion 24 of the plate 16 and a central portion in the form of a funnel 30. The flange 29 is preferably welded to the flange portion 24 of the plate 11. The double-filament incandescent lamp 18 is a special form of halogen lamp and comprises a hermetically sealed bulb 17 having a portion 32 which is squeezed flat and is held by cement 33 in the funnel 30. Three electrodes 34 emerge from the flat portion 32 which each pass through a respective one of said apertures 22 and each of which carries a length of tubing 35 in the region of the base 21 of the plate 16 each length of tubing being sealed in its associated aperture 22 by a respective mass of fused glass 36. A respective L-shaped connector lug 37 is mounted with its short arm 38 on the end of one of the lengths of tubing 35 and firmly attached thereto, as well as to the electrode passing therethrough, preferably by means of solder.

The cross-piece 19 of the beam cover plate 20 (Figure 1) is welded to the socket 28. The welding seam 26 between the reflector 11 and the lamp plate 16 must be continuous, so that the interior of the reflector 27 is sealed in a gas-tight manner. An alternative embodiment is shown in Figure 3 where the ring portion 40 of the lamp plate 41 is flanged at 42 to form an annular groove between itself and the neck 15, into which is inserted an 0-ring 43, so that a seal is also achieved with the neck 15 of the reflector 11. The lamp plate 41 and the reflector 11 need then be joined to one another only at a few points by soldering or welding. In this embodiment it is preferred if the socket 28 extends into the region of said annular groove, thereby forming a U-shaped accommodation for the 0-ring 43, so that the latter is retained against axial displacement and the axial contact pressure of the 0-ring is further increased.

In the second embodiment shown in Figure 4 the socket comprises a ceramic body 45 formed with a hollow annular side portion 46 and a base 47 having a cutout portion 48. The flat portion 32 of the two-filament incandescent lamp 18 is held by cement 33, the three electrodes 49 extending through the cut-out portion in the base 47. The lamp plate is in the form of a glass plate 50 having a flat base portion 51 and an annular edge portion 52 formed with a U-shaped annular groove 53. The reflector neck 15 rests against the inside 54 of the groove 53, the groove 53 being substantially filled by a synthetic resin 55. The resin 55 is effective to form a gas-tight seal between the neck 15 and the plate 50. Three stepwise tapering caps 56 are fused into the base 51 of the glass plate 50. An annular portion 58 of a respective lug 57 is slid over each cap 56 and soldered on at 59.

Three plates 60 are attached to the ceramic socket 45 in line with its base 47. A pin 61, preferably having an angular cross-section is fixed by a respective tubular rivet 62 to each plate 60, each pin 62 projecting from a respective one of the caps 56 to which it is soldered. In this embodiment, each electrode 49 is in conductive connection with a respective pin 61 at a junction 63. The cross-piece 19 of the screening cap 20 (Figure 1) is likewise attached to the plate 60 by the tubular rivet 62.

A different manner of attachment of a glass plate 64 to a reflector 65 is illustrated in Figure 5, where the reflector neck is formed by a retaining ring 67 of generally S-shaped cross-section. A gas-tight joint is achieved by the ring 67 whose smaller loop 68 holds the reflector 65. The annular chambers 70 and 71 formed by the loops of the ring 67 are filled with an adhesive compound, preferably silicon rubber, or else with 0-rings, which seals the reflector 65 relative to the glass plate 64.

Figure 6 illustrates a third embodiment using a halogen lamp, the bulb 75 and lugs 77 of which are inserted in a lamp socket 76, a lamp plate 78 being in tight contact with the peripheral surface of the socket 76. The lamp plate is bent in swan-necked form, as viewed in cross-section, in such a way that a rim 79 thereof extends substantially axially. The neck 15 of the reflector 11 supports a flanged ring 80 which is pressed over punched points 81 onto the reflector 11 and so forms an annular trough into which is poured a synthetic resin 55. A cross-piece 82, notched out from the reflector neck 15, engages a trough 83 when the light-bulb is inserted, by virtue of which a correct co-ordination of the lamp with the reflector is achieved. The whole circumference of the rim 79 extends into the synthetic resin 55 and thus provides a seal between the lamp plate 78 and the reflector 11. Three lugs 84 project from the flange ring 80, which lugs 84, after the incandescent lamp has been inserted, are bent into the position shown, and thus grip the lamp plate 78 to maintain its fixed position on the reflector neck 15.

In the arrangement of Figure 7, the reflector 11 supports a halogen lamp by means of its neck 15, the bulb portion 32 of the lamp being cemented into a socket 85 closed at its rearward end by a socket plug 86. As before, respective connector lugs 37 are connected to the electrodes 34 by soldering. The socket 85 is provided with an outwardly extending fixing lug 87 which engages in a recess of the reflector neck 15 and so fixes the incandescent lamp in the reflector 11. Furthermore, the three ears 88 project from the shell of the socket plug for

determining the axial position of the socket 85. When the lamp is inserted, the socket 85 is fixed in its predetermined position with respect to the optical axis 0-0 and a plastics sleeve 89 acting as a lamp plate is subsequently moulded around it, so that a lasting and fixed connection with the reflector is achieved. To ensure a thorough interengagement of the sleeve 89 and the reflector neck 15, several slots 90 are punched out of the neck into which plastics material is also injected during the manufacture of the sleeve.

A further manner of accomplishing a gas tight connection between the incandescent bulb and the reflector 11 is illustrated in Figure 8 where the bulb 17, or the flat portion 32 thereof, is held by a cap 92 which in turn is fitted on a sleeve-like socket 93, the rear portion of which is closed by a plate 94. A bush 95 for each electrode 34 is moulded into the latter plate, each bush 95 holding in its bore a respective electrode 34 and on its collar 96 a connector lug 37. In the vertex region of the reflector 11, in addition to the neck 15, a truncated cone section 97 is formed. A tin-plated annular sleeve 98 acting as a lamp plate, which in its original state has a cylindrical and a flange-shaped part, is slid from the rear into the reflector neck 15 and is then rolled-in in such a manner that it rests flush against the neck 15 and against the truncated cone section 97. The annular sleeve is then heated inductively, so that the tin-plating melts an enters into a tight joint with the socket 93. If necessary solder may be additionally applied. A tension ring 101 has a loop-like projection 103 into which is inserted a cross-piece 19, the end portion of the ring 101 reaching almost to the annular sleeve 98. The lamp bulb 17 thus centred is sealed on its socket 93 with respect to the reflector 11 by adhesive compound 100 poured into the wedge-shaped throat 99, which additionally retains the cross-piece 19, whose end portion extends into the compound 100.

WHAT WE CLAIM IS:-

1. A sealed beam headlamp for a motor vehicle comprising a metal reflector with a diffusing lens attached thereto, the vertex region of the reflector containing an opening in which the bulb of a sealed halogen lamp is fixed by means of a socket and a lamp plate, in such a manner that the lamp is non-releasably, as herein defined, and hermetically sealed within the reflector, the lamp plate being welded, soldered, or cemented to or being moulded onto the rim of the opening.

2. A headlamp as claimed in claim 1, in which the lamp has a flattened bulb portion from which the lamp electrodes emerge, the lamp electrodes extending through said lamp plate in a gas-tight manner and the flattened bulb portion being held in the socket by means of a cement.

3. A headlamp as claimed in claim 2 in which the socket is formed from sheet-metal and comprises a flange portion attached to the lamp plate and a funnel portion which receives the flattened bulb portion and the cement holding the bulb portion in the socket.

4. A headlamp as claimed in any of claims 1 to 3 in which said lamp plate is formed of sheet metal and comprises a flanged portion bearing an axially extending ring portion which is tightly sealed by a circumferential welded seam to a substantially axially directed neck of the reflector.

5. A headlamp as claimed in any of claims 1 to 3, in which said lamp plate is formed of sheet metal and comprises a flanged portion bearing an axially extending ring portion the ring portion having a recess therein which receives an 0-ring serving as said sealing means, a substantially axially directed neck of the reflector being connected to the ring portion by several soldering or welding joints.

6. A headlamp as claimed in any of claims 1 to 5, in which said lamp plate has a base having a respective aperture therethrough for each electrode of the lamp into which a length of tubing is sealed by means of fused glass, each length of tubing being joined by a soldered joint to the electrode passing through it.

7. A headlamp as claimed in claim 1, in which a ring having an inwardly directed flange on one axial end and a number of inwardly directed lugs on its other end engages over a substantially axially directed neck of the reflector, the annular trough thereby formed between the ring and the reflector neck receiving a synthetic resin compound which cements the lamp plate to the neck, said lamp plate being in the form of a generally annular disc whose inner edge engages the periphery of the lamp bulb in a gas-tight manner and whose outer edge extends substantially axially and projects into said resin compound, the lugs on the ring gripping around the rear of the lamp plate.

8. A headlamp as claimed in claim 1 in which said lamp plate is constructed as a glass plate whose periphery has an axially directed portion having a U-shaped annular groove therein which receives a sealing compound cementing the lamp plate to a substantially axially directed neck of the reflector, the neck extending into the sealing compound to effect a gas-tight connection.

9. A headlamp as claimed in claim 8 in which said sealing compound is a synthetic resin and the reflector neck is centred by engagement with the radially inner surface of said U-shaped groove.

10. A headlamp as claimed in claim 1 in which said lamp plate is constructed as a glass plate and in which one loop of a holder ring of S-shaped cross-section embraces the reflector, the other loop gripping the peripheral edge of the glass lamp plate, and the reflector and the glass plate being cemented to the holder ring and thus to each other by a sealing medium.

11. A headlamp as claimed in claim 10 in which the sealing medium is a silicon rubber.

12. A headlamp as claimed in any of claims 8 to 11, in which the glass lamp plate has a respective aperture therethrough for each electrode and a respective cap fused to it, to which are soldered the associated electrode and a respective connector lug.

13. A headlamp as claimed in any of claims 8 to 12, in which the socket is in the form of a pot-shaped ceramic body the base of which has a cutout for the passage of the electrodes therethrough.

14. A headlamp as claimed in claim 1, in which the rear of the socket is sealed by a socket plug, the socket being received in tightly fitting relationship by a substantially axially directed neck of the reflector, and in which a plastics sleeve serving as the lamp plate surrounds both the rear end of the socket and the socket plug.

15. A headlamp as claimed in claim 14 in which the socket has an outwardly directed fixing lug which engages a notch on a substantially axially directed neck of the reflector and a plurality of ears project from the socket plug for fixing the axial position of the socket, the neck being formed with a plurality of axially directed slots in the rearward end thereof.

16. A headlamp as claimed in claim 1, in which the reflector is formed with a frusto-conical portion in its vertex region and in which an annular sleeve, serving as said lamp plate is inserted into the neck and is soldered to the socket, the wedge-shaped annular space so formed between the socket and the neck being filled with an adhesive compound to seal the socket to the reflector.

17. A headlamp as claimed in claim 16, in which a cross-piece of a cover plate for the bulb is inserted in a tension ring, one end portion of which extends into said adhesive compound in the wedge-shaped annular space.

18. A headlamp constructed substantially as hereinbefore particularly described with reference to and as illustrated in Figure 1 of the accompanying drawings.

19. A headlamp constructed substantially as hereinbefore particularly described with reference to and as illustrated in Figure 2 of the accompanying drawings.

20. A headlamp as claimed in claim 18 when modified substantially as hereinbefore particularly described with reference to and as illustrated in Figure 3 of the accompanying drawings.

21. A headlamp constructed substantially as hereinbefore particularly described with reference to and as illustrated in Figure 4 of the accompanying drawings.

22. A headlamp as claimed in claim 21 when modified substantially as hereinbefore particularly described with reference to and as illustrated in Figure 5 of the accompanying drawings.

23. A headlamp constructed substantially as hereinbefore particularly described with reference to and as illustrated in Figure 6 of the accompanying drawings.

24. A headlamp constructed substantially as hereinbefore particularly described with reference to and as illustrated in Figure 7 of the accompanying drawings.

25. A headlamp constructed substantially as hereinbefore particularly described with reference to and as illustrated in Figure 8 of the accompanying drawings.

W.P. THOMPSON & CO.
Chartered Patent Agents,
Coopers Buildings,
12, Church Street,
Liverpool, L1 3AB.

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Fig. 1

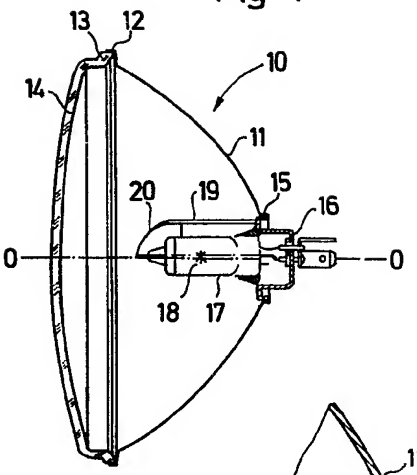

Fig. 3

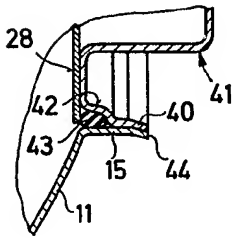

Fig. 2

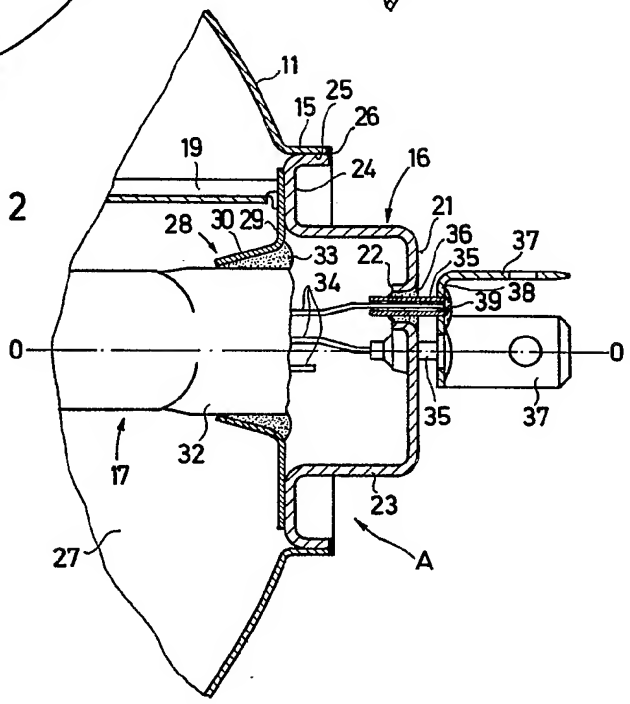

Fig. 4

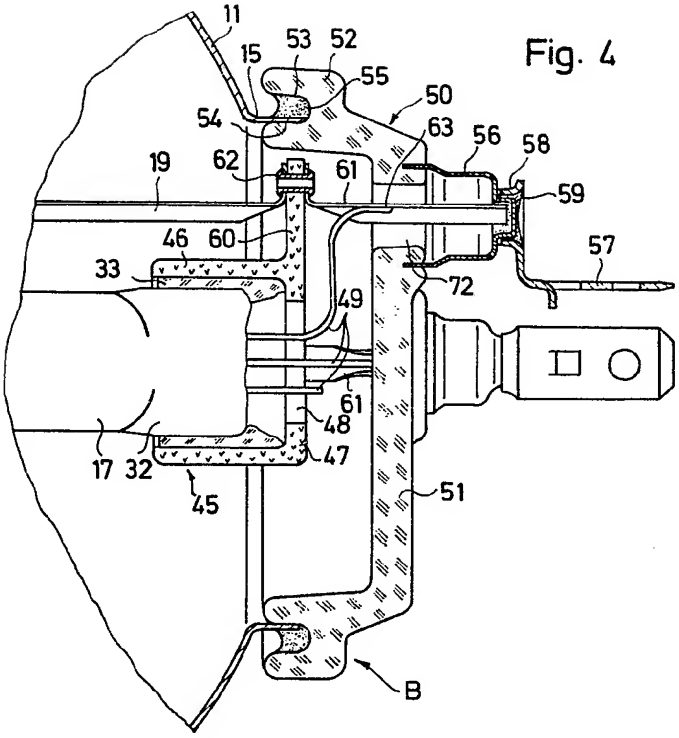
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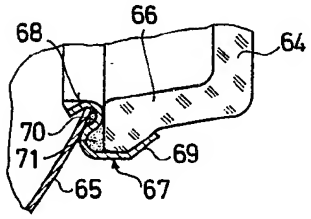
Fig. 5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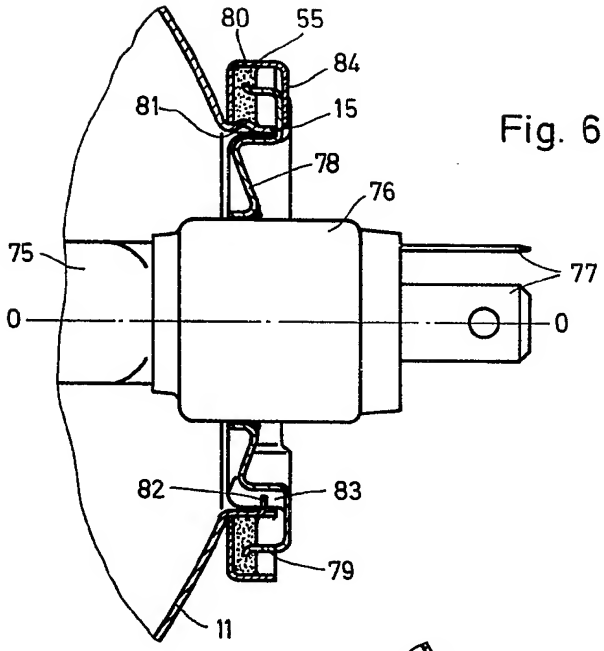
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Fig. 6

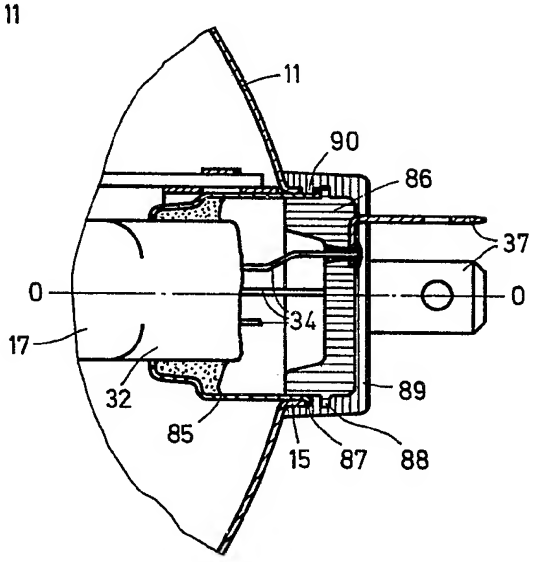
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Fig. 7

1442422 COMPLETE SPECIFICATION
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Sheet 4

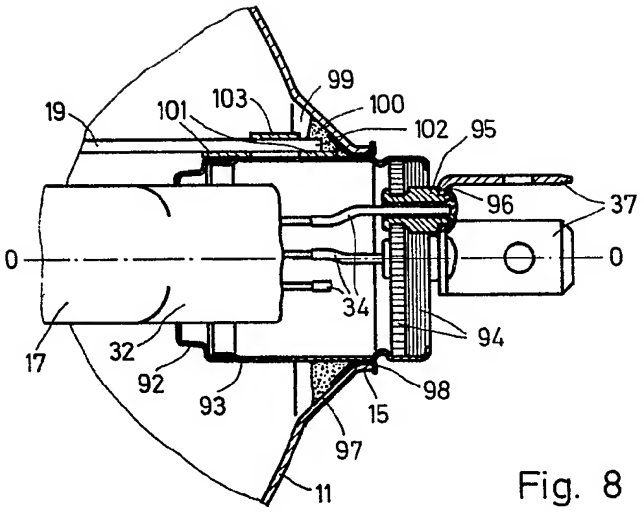

Fig. 8